

APPENDIX A
Outlier Procedure

An outlier in a data set is an observation (or data point) that is significantly different from the other data. The measure of difference is determined by the statistical methods known as a Z-score. Because the outlier test assumes data to be normally distributed, it is necessary to transform the data by computing the logarithm of each data point before performing the outlier test. The Z-score is calculated by dividing the difference between the data point and the average of the data set by the standard deviation. For data, this is normally distributed, 99.5 percent (or two standard deviations) of the measurements will have a Z-score between -2.0 and 2.0. A data point outside this range is not considered to be representative of the population from which the data are drawn.

EPA uses this statistical method to confirm that certain data do not represent treatment by a well-operated system. The Agency uses this method only in cases where data on the design and operation of a treatment system were limited. This method is a commonly used technique for evaluating data sets.

APPENDIX B

ANOVA Test

F Value Determination for ANOVA Test

EPA is using the statistical method known as analysis of variance (ANOVA) to determine the level of performance that represents "best" treatment where more than one technology is demonstrated. This method provides a measure of the differences between data sets.

If the Agency finds that the levels of performance for one or more technologies are not statistically different (i.e., the data sets are homogeneous), EPA then averages the long-term performance values achieved by each technology and multiplies this value by the largest variability factor associated with any of the acceptable technologies. If EPA finds that one technology performs significantly better (i.e., the data sets are not homogeneous), the "best" technology would be the technology that achieves the best level of performance, i.e., the technology with the lowest mean value.

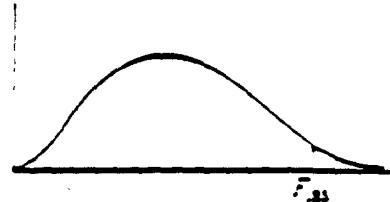
To determine whether any or all of the treatment performance data sets are homogeneous using the analysis of variance method, it is necessary to compare a calculated "F value" to what is known as a "critical value." (See Table B-1.) These critical values are available in most statistics texts (see, for example, *Statistical Concepts and Methods* by Bhattacharyya and Johnson, 1977, John Wiley Publications, New York).

Where the F value is less than the critical value, all treatment data sets are homogeneous. If the F value exceeds the critical value, it is necessary to perform a "pair wise F" test to determine whether any of the sets are homogeneous. The "pair wise F" test must be done for all of the various combinations of data sets using the same method and equation as the general F test.

CRITICAL VALUES

95th PERCENTILE VALUES FOR
THE F DISTRIBUTION

n_1 = degrees of freedom for numerator
 n_2 = degrees of freedom for denominator
 (shaded area = .95)



$$n_1 = k - 1 \quad n_2 = N - k$$

$\frac{n_1}{n_2}$	2	3	4	5	6	8	12	16	20	30	40	50	100	-
1	101.4	199.5	215.7	224.6	230.2	234.0	235.9	242.9	246.2	248.0	250.1	251.1	252.2	253.0
2	15.51	18.00	19.16	19.75	19.30	19.23	19.37	19.41	19.43	19.45	19.46	19.46	19.47	19.49
3	10.83	9.53	9.28	9.12	9.01	8.94	8.85	8.74	8.69	8.66	8.62	8.60	8.58	8.56
4	5.71	6.94	6.59	6.39	6.26	6.16	6.04	5.91	5.84	5.80	5.75	5.71	5.70	5.68
5	4.61	5.79	5.41	5.19	5.05	4.95	4.82	4.68	4.60	4.56	4.50	4.46	4.44	4.40
6	3.99	5.14	4.76	4.53	4.39	4.28	4.15	4.00	3.82	3.87	3.81	3.77	3.75	3.71
7	3.59	4.74	4.25	4.02	3.87	3.87	3.73	3.57	3.49	3.44	3.38	3.34	3.22	3.19
8	3.22	4.46	4.07	3.84	3.69	3.58	3.44	3.28	3.20	3.15	3.08	3.05	3.03	2.98
9	3.02	4.26	3.86	3.63	3.48	3.37	3.23	3.07	2.98	2.93	2.86	2.82	2.80	2.76
10	2.90	4.10	3.71	3.48	3.33	3.22	3.07	2.91	2.82	2.77	2.70	2.67	2.64	2.59
11	2.84	3.98	3.59	3.36	3.20	3.09	2.95	2.79	2.70	2.65	2.57	2.53	2.50	2.45
12	2.73	3.89	3.49	3.26	3.11	3.00	2.85	2.69	2.60	2.54	2.46	2.42	2.40	2.35
13	2.67	3.81	3.41	3.18	3.03	2.92	2.77	2.60	2.51	2.46	2.38	2.34	2.32	2.26
14	2.60	3.74	3.34	3.11	2.96	2.85	2.70	2.53	2.44	2.39	2.31	2.27	2.24	2.19
15	2.54	3.68	3.29	3.06	2.90	2.79	2.64	2.48	2.39	2.33	2.25	2.21	2.18	2.12
16	2.49	3.63	3.24	3.01	2.85	2.74	2.59	2.42	2.33	2.23	2.20	2.16	2.13	2.07
17	2.45	3.59	3.20	2.96	2.81	2.70	2.55	2.38	2.29	2.23	2.15	2.11	2.08	2.02
18	2.41	3.55	3.16	2.93	2.77	2.66	2.51	2.34	2.25	2.19	2.11	2.07	2.04	1.98
19	2.38	3.52	3.13	2.90	2.74	2.63	2.48	2.32	2.23	2.15	2.07	2.02	1.99	1.94
20	2.35	3.49	3.10	2.87	2.71	2.60	2.45	2.29	2.20	2.12	2.04	1.99	1.96	1.90
21	2.30	3.44	3.05	2.82	2.66	2.55	2.40	2.23	2.13	2.07	1.98	1.93	1.91	1.84
22	2.26	3.40	3.01	2.78	2.62	2.51	2.36	2.18	2.09	2.03	1.94	1.89	1.86	1.80
23	2.22	3.37	2.98	2.74	2.59	2.47	2.32	2.15	2.05	1.99	1.90	1.85	1.82	1.76
24	2.20	3.34	2.95	2.71	2.56	2.45	2.29	2.12	2.02	1.96	1.87	1.81	1.78	1.68
25	2.17	3.22	2.92	2.69	2.53	2.42	2.27	2.09	1.99	1.93	1.84	1.79	1.76	1.69
26	2.13	3.17	2.84	2.61	2.46	2.34	2.18	2.00	1.90	1.84	1.74	1.69	1.66	1.59
27	2.10	3.13	2.79	2.56	2.41	2.29	2.12	1.95	1.85	1.78	1.69	1.63	1.60	1.52
28	2.07	3.09	2.74	2.50	2.35	2.23	2.07	1.89	1.79	1.72	1.62	1.59	1.56	1.48
29	2.04	3.05	2.70	2.46	2.31	2.19	2.02	1.84	1.74	1.66	1.56	1.53	1.45	1.35
30	2.01	3.02	2.69	2.43	2.28	2.17	2.00	1.82	1.72	1.62	1.52	1.49	1.46	1.35
40	2.08	2.97	2.84	2.61	2.46	2.34	2.18	2.00	1.90	1.84	1.74	1.69	1.66	1.59
50	2.03	2.93	2.79	2.56	2.40	2.29	2.13	1.95	1.85	1.78	1.69	1.63	1.60	1.52
60	2.00	2.85	2.76	2.53	2.37	2.25	2.09	1.92	1.81	1.73	1.65	1.59	1.56	1.48
70	2.98	2.83	2.74	2.50	2.35	2.23	2.07	1.89	1.79	1.72	1.62	1.56	1.53	1.45
80	2.96	2.81	2.72	2.48	2.33	2.21	2.05	1.88	1.77	1.70	1.60	1.54	1.51	1.42
100	2.94	2.09	2.70	2.46	2.30	2.19	2.03	1.85	1.75	1.68	1.57	1.51	1.48	1.39
150	2.91	2.06	2.67	2.43	2.27	2.16	2.00	1.82	1.72	1.64	1.54	1.47	1.44	1.34
200	2.89	2.04	2.05	2.41	2.26	2.14	1.98	1.80	1.69	1.62	1.52	1.45	1.42	1.32
400	2.86	2.00	2.02	2.29	2.02	2.02	1.96	1.78	1.67	1.60	1.49	1.42	1.38	1.28
-	2.54	2.99	2.60	2.37	2.22	2.09	1.94	1.75	1.64	1.57	1.46	1.40	1.32	1.24
														1.00

Table B-7 95th Percentile Values for the F Distribution

The F value is calculated as follows:

- (i) All data are natural logtransformed.
- (ii) The sum of the data points for each data set is computed (T_i).
- (iii) The statistical parameter known as the sum of the squares between data sets (SSB) is computed:

$$SSB = \left[\sum_{i=1}^k \left(\frac{T_i^2}{n_i} \right) \right] - \left(\frac{\left[\sum_{i=1}^k T_i \right]^2}{N} \right)$$

where:

- k = number of treatment technologies
- n_i = number of data points for technology i
- N = number of data points for all technologies
- T_i = sum of natural logtransformed data points for each technology.

- (iv) The sum of the squares within data sets (SSW) is computed:

$$SSW = \left[\sum_{i=1}^k \sum_{j=1}^{n_i} x_{i,j}^2 \right] - \sum_{i=1}^k \left(\frac{T_i^2}{n_i} \right)$$

where:

- $x_{i,j}$ = The natural logtransformed observations (j) for treatment technology (i).
- (v) The degrees of freedom corresponding to SSB and SSW are calculated. For SSB, the degree of freedom is given by $k-1$. For SSW, the degree of freedom is given by $N-k$.

(vi) Using the above parameters, the F value is calculated as follows:

$$F = \frac{MSB}{MSW}$$

where:

MSB = SSB/(k-1) and

MSW = SSW/(N-k).

A computational table summarizing the above parameters is shown below.

Computational Table for the F Value

Source	Degrees of freedom	Sum of squares	Mean square	F
Between MSB/MSW	k-1	SSB	MSB = SSB/k-1	
Within	N-k	SSW	MSW = SSW/N-k	

Following are three examples of the ANOVA calculation. The first two represent treatment by different technologies that achieve statistically similar treatment; the last example represents a case where one technology is significantly better treatment than the other technology.

Example 1
Methylene Chloride

Influent ($\mu\text{g/l}$)	Effluent ($\mu\text{g/l}$)	<u>Steam stripping</u>		Influent ($\mu\text{g/l}$)	<u>Biological treatment</u>		$[\ln(\text{effluent})]^2$
		$\ln(\text{effluent})$	$[\ln(\text{effluent})]^2$		Effluent ($\mu\text{g/l}$)	$\ln(\text{effluent})$	
1550.00	10.00	2.30	5.29	1960.00	10.00	2.30	5.29
1290.00	10.00	2.30	5.29	2568.00	10.00	2.30	5.29
1640.00	10.00	2.30	5.29	1817.00	10.00	2.30	5.29
5100.00	12.00	2.48	6.15	1640.00	26.00	3.26	10.63
1450.00	10.00	2.30	5.29	3907.00	10.00	2.30	5.29
4600.00	10.00	2.30	5.29				
1760.00	10.00	2.30	5.29				
2400.00	10.00	2.30	5.29				
4800.00	10.00	2.30	5.29				
12100.00	10.00	2.30	5.29				
Sum:		23.18	53.76			12.46	31.79
Sample Size:		10	10	5	5	5	-
Mean:		3669	10.2	2378	13.2	2.49	-
Standard Deviation:		3328.67	.63	923.04	7.15	.43	-
Variability Factor:		1.15	-	-	2.48	-	-

ANOVA Calculations:

$$SSB = \left[\sum_{i=1}^k \left(\frac{T_i^2}{n_i} \right) \right] - \left[\frac{\left(\sum_{i=1}^k T_i \right)^2}{N} \right]$$

$$SSW = \left[\sum_{i=1}^k \sum_{j=1}^{n_i} x_{i,j}^2 \right] - \sum_{i=1}^k \left(\frac{T_i^2}{n_i} \right)$$

$$MSB = SSB/(k-1)$$

$$MSW = SSW/(N-k)$$

Example 1 (continued)

$$F = MSB/MSW$$

where:

k = number of treatment technologies

n_i = number of data points for technology i

N = number of natural logtransformed data points for all technologies

T_i = sum of logtransformed data points for each technology

X_{ij} = the nat. logtransformed observations (j) for treatment technology (i)

$$n_1 = 10, n_2 = 5, N = 15, k = 2, T_1 = 23.18, T_2 = 12.46, T = 35.46, T^2 = 1270.21$$

$$T_1^2 = 537.31 \quad T_2^2 = 155.25$$

$$SSB = \left(\frac{537.31}{10} + \frac{155.25}{5} \right) - \frac{1270.21}{15} = 0.10$$

$$SSW = (53.76 + 31.79) - \left(\frac{537.31}{10} + \frac{155.25}{5} \right) = 0.77$$

$$MSB = 0.10/1 = 0.10$$

$$MSW = 0.77/13 = 0.06$$

$$F = \frac{0.10}{0.06} = 1.67$$

ANOVA Table

Source	Degrees of freedom	SS	MS	F value
Between(B)	1	0.10	0.10	1.67
Within(W)	13	0.77	0.06	

The critical value of the F test at the 0.05 significance level is 4.67. Since the F value is less than the critical value, the means are not significantly different (i.e., they are homogeneous).

NOTE: All calculations were rounded to two decimal places. Results may differ depending upon the number of decimal places used in each step of the calculation.

Example 2
Trichloroethylene

Influent ($\mu\text{g/l}$)	<u>Activated sludge followed by adsorption</u>			Influent ($\mu\text{g/l}$)	<u>Biological treatment</u>		
	Effluent ($\mu\text{g/l}$)	ln(efluent)	[ln(efluent)] ²		Effluent ($\mu\text{g/l}$)	ln(efluent)	[ln(efluent)] ²
1650.00	10.00	2.30	5.29	200.00	10.00	2.30	5.29
5200.00	10.00	2.30	5.29	224.00	10.00	2.30	5.29
5000.00	10.00	2.30	5.29	134.00	10.00	2.30	5.29
1720.00	10.00	2.30	5.29	150.00	10.00	2.30	5.29
1560.00	10.00	2.30	5.29	484.00	16.25	2.79	7.78
10300.00	10.00	2.30	5.29	163.00	10.00	2.30	5.29
210.00	10.00	2.30	5.29	182.00	10.00	2.30	5.29
1600.00	27.00	3.30	10.89				
204.00	85.00	4.44	19.71				
160.00	10.00	2.30	5.29				
Sum:		26.14	72.92			16.59	39.52
Sample Size:		10	10	7	7	7	-
Mean:		2760	19.2	220	10.89	2.37	-
Standard Deviation:		3209.6	23.7	120.5	2.36	.19	-
Variability Factor:		-	3.70	-	1.53	-	-

ANOVA Calculations:

$$SSB = \left[\sum_{i=1}^k \left(\frac{T_i^2}{n_i} \right) \right] - \left[\frac{\left(\sum_{i=1}^k T_i \right)^2}{N} \right]$$

$$SSW = \left[\sum_{i=1}^k \sum_{j=1}^{n_i} x_{i,j}^2 \right] - \sum_{i=1}^k \left(\frac{T_i^2}{n_i} \right)$$

$$MSB = SSB/(k-1)$$

$$MSW = SSW/(N-k)$$

Example 2 (continued)

$$F = MSB/MSW$$

where:

k = number of treatment technologies

n_i = number of data points for technology i

N = number of natural logtransformed data points for all technologies

T_i = sum of logtransformed data points for each technology

X_{ij} = the nat. logtransformed observations (j) for treatment technology (i)

$$N_1 = 10, N_2 = 7, N = 17, k = 2, T_1 = 26.14, T_2 = 16.59, T = 42.73, T^2 = 1825.85, T_1^2 = 683.30, T_2^2 = 275.23$$

$$SSB = \left(\frac{683.30}{10} + \frac{275.23}{7} \right) - \frac{1825.85}{17} = 0.25$$

$$SSW = (72.92 + 39.52) - \left(\frac{683.30}{10} + \frac{275.23}{7} \right) = 4.79$$

$$MSB = 0.25/1 = 0.25$$

$$MSW = 4.79/15 = 0.32$$

$$F = \frac{0.25}{0.32} = 0.78$$

ANOVA Table

Source	Degrees of freedom	SS	MS	F value
Between(B)	1	0.25	0.25	0.78
Within(W)	15	4.79	0.32	

The critical value of the F test at the 0.05 significance level is 4.54. Since the F value is less than the critical value, the means are not significantly different (i.e., they are homogeneous).

NOTE: All calculations were rounded to two decimal places. Results may differ depending upon the number of decimal places used in each step of the calculation.

Example 3
Chlorobenzene

Influent ($\mu\text{g/l}$)	Steam stripping			Influent ($\mu\text{g/l}$)	Biological treatment		
	Effluent ($\mu\text{g/l}$)	ln(effluent)	[ln(effluent)] ²		Effluent ($\mu\text{g/l}$)	ln(effluent)	[ln(effluent)] ²
7200.00	80.00	4.38	19.18	9206.00	1083.00	6.99	48.86
6500.00	70.00	4.25	18.06	16646.00	709.50	6.56	43.03
6075.00	35.00	3.56	12.67	49775.00	460.00	6.13	37.58
3040.00	10.00	2.30	5.29	14731.00	142.00	4.96	24.60
				3159.00	603.00	6.40	40.96
				6756.00	153.00	5.03	25.30
				3040.00	17.00	2.83	8.01
Sum:							
-	-	14.49	55.20	-	-	38.90	228.34
Sample Size:							
4	4	4	-	7	7	7	-
Mean:							
5703	49	3.62	-	14759	452.5	5.56	-
Standard Deviation:							
1835.4	32.24	.95	-	16311.86	379.04	1.42	-
Variability Factor:							
-	7.00	-	-	-	15.79	-	-

ANOVA Calculations:

$$SSB = \left[\sum_{i=1}^k \left(\frac{T_i^2}{n_i} \right) \right] - \left[\frac{\left(\sum_{i=1}^k T_i \right)^2}{N} \right]$$

$$SSW = \left[\sum_{i=1}^k \sum_{j=1}^{n_i} x_{i,j}^2 \right] - \sum_{i=1}^k \left(\frac{T_i^2}{n_i} \right)$$

$$MSB = SSB/(k-1)$$

$$MSW = SSW/(N-k)$$

Example 3 (continued)

$$F = MSB/MSW$$

where:

k = number of treatment technologies

n_i = number of data points for technology i

N = number of natural logtransformed data points for all technologies

T_i = sum of logtransformed data points for each technology

X_{ij} = the nat. logtransformed observations (j) for treatment technology (i)

$$N_1 = 4, N_2 = 7, N = 11, k = 2, T_1 = 14.49, T_2 = 38.90, T = 53.39, T^2 = 2850.49, T_1^2 = 209.96, T_2^2 = 1513.21$$

$$SSB = \left(\frac{209.96}{4} + \frac{1513.21}{7} \right) - \frac{2850.49}{11} = 9.52$$

$$SSW = (55.20 + 228.34) - \left(\frac{209.96}{4} + \frac{1513.21}{7} \right) = 14.88$$

$$MSB = 9.52/1 = 9.52$$

$$MSW = 14.88/9 = 1.65$$

$$F = 9.52/1.65 = 5.77$$

ANOVA Table

Source	Degrees of freedom	SS	MS	F value
Between(B)	1	9.53	9.53	5.77
Within(W)	9	14.89	1.65	

The critical value of the F test at the 0.05 significance level is 5.12. Since the F value is less than the critical value, the means are significantly different (i.e., they are heterogeneous). Activated sludge followed by carbon adsorption is "best" in this example because the mean of the long-term performance value, i.e., the effluent concentration, is lower.

NOTE: All calculations were rounded to two decimal places. Results may differ depending upon the number of decimal places used in each step of the calculation.

APPENDIX C

Accuracy Correction Procedure

Accuracy Correction Procedure

To calculate treatment standards, it is first necessary to adjust laboratory results for accuracy, based on the laboratory test's "recovery value" for each constituent it analyzes.* The recovery value measures the amount of constituent recovered after "spiking"--the addition to the waste sample of a known amount of constituent. The recovery value is equal to the amount of constituent recovered after spiking, minus the initial concentration in the sample, divided by the amount recovered.

Once the recovery value is determined, the following procedures are used to select the appropriate percent recovery value to adjust the analytical data:

1. If duplicate spike recovery values are available for the constituent of interest, the data are adjusted by the lowest available percent recovery value--the value that will yield the most conservative estimate of treatment achieved. (If a spike recovery value of less than 20 percent is reported for a specific constituent, however, the data cannot be used to set a national treatment standard and are discarded.)
2. If data are not available for a specific constituent, but are available for an isomer, then the spike recovery data are transferred from the isomer, and the data are adjusted using the percent recovery selected, according to the procedure described in (1) above.
3. If data are not available for a specific constituent, but are available for a similar class of constituents, then spike recovery values for this class of constituents are transferred. All spike recovery values greater than or equal to 20 percent for a spiked sample are averaged, and the constituent concentration is adjusted by the average recovery value. If spiked recovery data are available for more than one sample, the average is calculated for each sample and the data are adjusted by the lowest average value.
4. If spike recovery data are not available for the waste matrix, then spike recovery values are transferred from a waste that the Agency believes is a similar matrix. For instance, if the data are for an ash resulting from incineration, then data from other incinerator

*It may also be necessary to estimate recovery values in order to perform the ANOVA test discussed in Section 3.2 to determine which demonstrated technologies are "best."

ashes could be used. This is not an exact analysis, but it is considered the best practical approach. In assessing the recovery data to be transferred, the procedures outlined in (1), (2), and (3) above are followed.

The analytical procedures employed to generate the data used to calculate each treatment standard for tested wastes are provided in the background document prepared for that waste. Any alternatives or equivalent procedures and/or equipment allowed by the approved methods will also be documented in EPA's SW-846, Third Edition (November 1986). NOTE: The Agency will use the methods and procedures presented in each background document to enforce the treatment standards. Facilities should, therefore, use these procedures in assessing the performance of their treatment systems.

APPENDIX D

Variability Factor

Variability Factor

$$VF = \frac{C_{99}}{\text{Mean}}$$

(1)

Where:

VF = estimate of the daily maximum variability factor determined from a sample population of daily data.

C_{99} = Estimate of performance values for which 99 percent of the daily observations will be below. C_{99} is calculated using the following equation: $C_{99} = \text{Exp}(y + 2.33 Sy)$ where y and Sy are the mean and standard deviation, respectively, of the logtransformed data.

Mean = Average of the individual performance values.

EPA is establishing this figure as a maximum, because the Agency believes that on a day-to-day basis the waste should meet the applicable treatment standards. In addition, establishing this requirement makes it easier to check compliance on a single day. The 99th percentile is appropriate because it accounts for almost all process variability.

In several cases, all the results from analysis of the residuals from BDAT treatment are found at concentrations less than the detection limit. In such cases, all the actual concentration values are considered to be unknown and, hence, cannot be used to estimate the variability factor of the analytical results. The following is a description of EPA's approach for calculating the variability factor for cases in which all concentrations are below the detection limit.

It has been postulated that a lognormal distribution adequately describes the variation among concentrations. Agency data shows that the treatment residual concentrations are often distributed approximately lognormally. Therefore, the lognormal model has been used routinely in EPA's development of numerous regulations in the Effluent Guidelines Program and is being

used in the BDAT program. The variability factor (VF) was defined as the ratio of the 99th percentile (C_{99}) of the lognormal distribution to its arithmetic mean (Mean).

$$VF = \frac{C_{99}}{\text{Mean}}$$
 (1)

The relationship between the parameters of the lognormal distribution and the parameters of the normal distribution created by taking the natural logarithms of the lognormally distributed concentrations can be found in most mathematical statistics texts. (See, for example, Volume 1, by Johnson and Kotz, 1970). The mean of the lognormal distribution can be expressed in terms of the mean (μ) and standard deviation (σ) of the normal distribution as follows:

$$C_{99} = \text{Exp}(\mu + 2.33) \quad (2)$$

$$\text{Mean} = \text{Exp}(\mu + 0.5\sigma^2) \quad (3)$$

By substitution (2) and (3) in (1), the VF can then be expressed in terms of σ as follows:

$$VF = \text{Exp}(2.33\sigma - 0.5\sigma^2) \quad (4)$$

For residuals with concentrations that are not all below the detection limit, the 99th percentile and the mean can be estimated from the actual analytical data and, accordingly, the VF can be estimated using equation (1). For residuals with concentrations that are below the detection limit, the above equations can be used in conjunction with the following assumptions to develop a VF:

- Assumption 1: The actual concentrations follow a lognormal distribution. The upper limit (UL) is equal to the detection limit. The lower limit (LL) is equal to one-tenth of the detection limit. This assumption is based on the fact that data from well-designed and well-operated treatment systems generally fall within one order of magnitude.

- Assumption 2: The natural logarithms of the concentrations have a normal distribution with an upper limit equal to $\ln(\text{UL})$ and a lower limit equal to $\ln(\text{LL})$.
- Assumption 3: The standard deviation (σ) of the normal distribution is approximated by:

$$\sigma = [(\ln(\text{UL}) - \ln(\text{LL})) / (2(2.33))] = [\ln(\text{UL}/\text{LL})] / 4.55 \quad (5)$$

(Note that when $\text{LL} = (0.1)(\text{UL})$ as in Assumption 1, then $\sigma = (\ln 10) / 4.66 = 0.494$.)

Substitution of the σ values from equation (5) into equation (4) yields the VF.

$$\text{VF} = 2.8$$

For concentration data with only two data points, a reliable estimate of the variability of the data and, hence, the VF cannot be obtained. Nevertheless, the following procedure assumes that the population of concentration data from which these two samples were drawn is lognormally distributed. It is also assumed that the values of these two samples represent an estimate of the range (min and max) of population data.

The standard deviation σ of the corresponding normal distribution can be estimated using the ratio of the two available data points, R, (larger value/smaller value) as

$$\sigma = [\log(R)] / (2 * 2.33) = \log R / 4.66 \quad (6)$$

For several values of R (10, 20,...100), the value of VF was obtained and tabulated in Table C-1. To use the table to find the VF (as calculated using (4)), the ratio of the larger value to the smaller value is obtained and rounded to the nearest R value in the Table. Alternatively, VF can be calculated by combining equations (4) and (6). The treatment standard is then calculated as:

$$C^9 = (\text{VF}) \text{ (mean)} \quad (7)$$

The mean is the average of the two treatment values.

Table D-1. Variability Factors When only Two Data Points Are Available

Ration of larger value to smaller value (order of magnitude)	Variability Factor
5	2.11
10	2.80
20	3.64
30	4.20
40	4.62
50	4.97
60	5.27
70	5.52
80	5.75
90	5.95
100	6.14

APPENDIX E

**Calculation of Variability Factor When All
Treated Residual Concentrations are
Below the Detection Limit**

Calculation of Variability Factor When All Treated Soil Concentrations are Below the Detection Limit

Agency data show that the treatment residual concentrations are often distributed approximately lognormally. Therefore, the lognormal model has been used routinely in EPA's development of numerous regulations in the Effluent Guidelines Program and is being used in the BDAT program. The variability factor (VF) was defined as the ratio of the 99th percentile (C_{99}) of the lognormal distribution to its arithmetic mean (Mean).

$$VF = \frac{C_{99}}{\text{Mean}} \quad (1)$$

The relationship between the parameters of the lognormal distribution and the parameters of the normal distribution, created by taking the natural logarithms of the lognormally distributed concentrations, can be found in most mathematical statistics texts. (See, for example, Volume 1, Johnson and Kotz, 1970.) The mean of the lognormal distribution can be expressed in terms of the mean (μ) and standard deviation (s) of the normal distribution as follows:

$$C_{99} = \text{Exp} (\mu + 2.33 s) \quad (2)$$

$$\text{Mean} = \text{Exp} (\mu + 0.5 s^2) \quad (3)$$

By substitution (2) and (3) in (1), the VF can then be expressed in terms of (s) as follows:

$$VF = \text{Exp} (2.33 s - 0.5s^2) \quad (4)$$

For residuals with concentrations that are not all below the detection limit, the 99th percentile and the mean can be estimated from the actual analytical data and, accordingly, the VF can be estimated using equation 1. For residuals with concentrations below the detection limit, the above equations can be used in conjunction with the following assumptions to develop a VF.

- Assumption 1: The actual concentrations follow a lognormal distribution. The upper limit (UL) is equal to the detection limit. The lower limit (LL) is equal to one-tenth of the detection limit. This assumption is based on the fact that data from well-designed and well-operated treatment systems generally fall within one order of magnitude.
- Assumption 2: The natural logarithms of the concentrations have a normal distribution with an upper limit equal to $\ln(UL)$ and a lower limit equal to $\ln(LL)$.
- Assumption 3: The standard deviation of the normal distribution is approximated by:

$$s = [(\ln(UL) - \ln(LL)) / (2 * 2.33)] = [\ln(UL/LL)] / 4.66 \quad (5)$$

(Note, when $LL = (0.1)(UL)$ as in Assumption 1, then $s = (\ln 10) / 4.66 = 0.494$.)

Substitution of the s values from equation (5) into equation (4) yields the VF.

$$VF = 2.8 \quad (6)$$

For concentration data with only two data points, the following procedure can be used to estimate the variability of the data. This procedure assumes that the population of concentration data from which these two samples were drawn is lognormally distributed. It is also assumed that the values of these two samples represent an estimate of the range (min. and max.) of population data.

The standard deviation (s) of the corresponding normal distribution can be estimated using the ratio of the two available data points, R , (larger value/smaller value) as:

$$s = [\ln(R)] / (2 * 2.33) = \ln R / 4.66 \quad (7)$$

For several values of R (10, 20,...100), the value of VF was obtained and tabulated in Table F-1. To use Table F-1 to find the VF (as calculated using (4)), the ratio of the larger value to the smaller value is obtained and rounded to the nearest R value. Alternatively, VF can be calculated by combining equations (4) and (7). The treatment standard is then calculated as:

$$C^{99} = (VF) \text{ (mean)} \quad (8)$$

The mean is the average of the two treatment values.

**Table F-1 Variability Factors When only Two
Data Points Are Available**

Ratio of larger value to smaller value (order of magnitude)	Variability Factor
5	2.11
10	2.80
20	3.64
30	4.20
40	4.62
50	4.97
60	5.27
70	5.52
80	5.75
90	5.95
100	6.14

APPENDIX F

Regulatory Standards for BDAT List Constituents

REGULATORY STANDARDS FOR BDAT LIST CONSTITUENTS

Table of Contents

	<u>Page</u>
1. Footnotes	1
2. Volatile Organics	2
3. Semivolatile Organics	10
4. Metals	21
5. Inorganics Other than Metals	27
6. Pesticides/Herbicides/Insecticides	28
6.1 Organochlorine Pesticides	28
6.2 Phenoxyacetic Acid Herbicides	30
6.3 Organophosphorous Insecticides	30
7. PCBs	31
8. Dioxins and Furans	31

FOOTNOTES

1. Wet air/carbon for salts.
 2. Based on EP leachate analysis but this does not preclude the use of TCLP analysis.
 3. Sum of diphenylamine and diphenylnitrosamine.
 4. High mercury subcategory ≥ 260 mg/kg total mercury.
 5. High mercury subcategory ≥ 260 mg/kg total mercury - contains mercury and organics (and are not incinerator residues).
 6. High mercury subcategory ≥ 260 mg/kg total mercury - inorganics (including incineration residues and residues from retorting of mercury).
 7. Low mercury subcategory < 260 mg/kg total mercury.
 8. Low mercury subcategory < 260 mg/kg total mercury - residues from retorting of mercury.
 9. Low mercury subcategory < 260 mg/kg total mercury - that are not residues from retorting of mercury.
 10. Light ends subcategory.
 11. Spent filters/aids and desiccants subcategory.
 12. High Zn subcategory.
 13. Low Zn subcategory.
 14. In TCLP extract.
 15. Radioactive hazardous mixed waste.
- NR Not regulated.
- SDR Regulated by solvent/dioxin rule.
- TS Treatment technology specified.
- * Not on BDAT list but regulated.
- () Numbers in parenthesis refer to thirds.

Regulatory Standards for BDAT List Waste Constituents
Volatile Organics

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)		Non-wastewater standard (mg/kg)	
222.	Acetone	K086 U002 SDR	0.28 0.28 0.05	(3) (3)	160 160 0.59 ⁽¹³⁾	(3) (3)
1.	Acetonitrile	K011 K013 K014 U003	38 38 38 0.17	(3) (3) (3) (3)	1.8 1.8 1.8 0.17	(2) (2) (2) (3)
2.	Acrolein	P003	NR	(3)	TS	(3)
3.	Acrylonitrile	K011 K013 K014 U009	0.06 0.06 0.06 0.24	(3) (3) (3) (3)	1.4 1.4 1.4 84	(2) (2) (2) (3)
4.	Benzene	F005 K011 K013 K014 K048 K049 K051 K052 K060 K083 K085 K087 K103 K104 K105 U019	0.07 0.02 0.02 0.02 0.011 0.011 0.011 0.011 0.17 0.14 0.14 0.014 0.15 0.15 0.14 0.14	(3) (3) (3) (3) (1) (1) (1) (1) (3) (3) (3) (1) (1) (1) (1) (3)	3.7 0.03 0.03 0.03 14 14 14 14 0.071 6.6 4.4 0.071 6.0 6.0 4.4 36	(3) (2) (2) (2) (3) (3) (3) (3) (3) (3) (3) (1) (1) (1) (1) (3)
5.	Bromodichloromethane	NR				
6.	Bromomethane	U029	0.11	(3)	15	(3)

Regulatory Standards for BDAT List Waste Constituents
Volatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)		Non-wastewater standard (mg/kg)	
223.	n-Butyl alcohol	K086 U031 SDR	5.6 5.6 5.0	(3) (3)	2.6 2.6 5.0 ⁽¹³⁾	(3)
7.	Carbon tetrachloride	F025 ^(*) F025 ^(*) K021 K073 U211 SDR	0.057 0.057 0.057 0.057 0.057 0.05	(3) (3) (3) (3) (3)	6.2 6.2 6.2 6.2 5.6 0.96 ⁽¹³⁾	(3) (3) (3) (3) (3)
8.	Carbon disulfide	K049 SDR	0.011 1.05	(1)	NR 4.81 ⁽¹³⁾	
9.	Chlorobenzene	K019 K085 K105 U037 SDR	0.006 0.057 0.057 0.057 0.15	(1) (3) (3) (3)	6.0 4.4 4.4 5.7 0.15 ⁽¹³⁾	(1) (3) (3) (3)
10.	2-Chloro-1,3-butadiene	F024	0.28	(2)	0.28	(2)
11.	Chlorodibromomethane	NR				
12.	Chloroethane	K018	0.007	(1)	6.0	(1)
13.	2-Chloroethylvinylether	NR				
14.	Chloroform	F025 ^(*) F025 ^(*) K009 K010 K019 K021 K029 K073 U044	0.046 0.046 0.10 0.10 0.007 0.046 0.046 0.046 0.046	(3) (3) (2) (2) (1) (3) (3) (3) (3)	6.2 6.2 6.0 6.0 6.0 6.2 6.0 6.2 5.6	(3) (3) (2) (2) (1) (3) (2) (3) (3)

13c

Regulatory Standards for BDAT List Waste Constituents
Volatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)		Non-wastewater standard (mg/kg)
15.	Chloromethane	K018 U045	0.007 0.19	(1) (3)	NR 33 (3)
16.	3-Chloropropene	F024	0.28	(2)	0.28 (2)
17.	1,2-Dibromo-3-chloropropane	U066	0.11	(3)	15 (3)
18.	1,2-Dibromoethane	U067	0.028	(3)	15 (3)
19.	Dibromoethane	U068	0.11	(3)	15 (3)
20.	Trans-1,4-Dichloro-2-butene	U074	TS	(3)	TS (3)
21.	2 Dichlorodifluoromethane	U075	0.23	(3)	7.2 (3)
22.	1,1-Dichloroethane	F024 K018 K028 U076	0.014 0.007 0.007 0.059	(2) (1) (2) (3)	0.014 6.0 (1) 6.0 (2) 7.2 (3)
23.	1,2-Dichloroethane	F024 F025 ^(*) K018 K019 K020 K029 U077	0.014 0.21 0.007 0.007 0.007 0.21 0.21	(2) (3) (1) (1) (1) (3) (3)	0.014 6.2 (3) 6.0 (1) 6.0 (1) 6.0 (1) 6.0 (2) 7.2 (3)
24.	1,1-Dichloroethylene	F025 ^(*) K029 U078	0.025 0.025 0.025	(3) (3) (3)	6.2 (3) 6.0 (2) 33 (3)
25.	Trans-1,2-Dichloroethene	U079	0.054	(3)	33 (3)

281

Regulatory Standards for BDAT List Waste Constituents
Volatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)		Non-wastewater standard (mg/kg)	
26.	1,2-Dichloropropane	F024 K017 U083	0.014 0.85 0.85	(2) (3) (3)	0.014 18 18	(2) (3) (3)
27.	Trans-1,3-Dichloropropene	F024 U084	0.014 0.036	(2) (3)	0.014 18	(2) (3)
28.	Cis-1,3-Dichloropropene	F024 U084	0.014 0.036	(2) (3)	0.014 18	(2) (3)
29.	1,4 Dioxane	U108	0.12	(3)	170	(3)
	2-Ethoxyethanol	F005	TS	(3)	TS	(3)
225.	Ethyl acetate	K086 U112 SDR	0.34 0.34 0.05	(3) (3) (3)	33 33 0.75 ⁽¹³⁾	(3) (3) (3)
226.	Ethyl benzene	K048 K049 K051 K052 K086 SDR	0.011 0.011 0.011 0.011 0.057 0.05	(1) (1) (1) (1) (3) (3)	14 14 14 14 6.0 0.053 ⁽¹³⁾	(3) (3) (3) (3) (3) (3)
30.	Ethyl cyanide	P101	0.24	(3)	360	(3)
227.	Ethyl ether	U117 SDR	0.12 0.05	(3) (3)	160 0.75 ⁽¹³⁾	(3) (3)
31.	Ethyl methacrylate	U118	0.14	(3)	160	(3)
214.	Ethylene oxide	NR				
32.	Iodomethane	U138	0.19	(3)	65	(3)
33.	Isobutyl alcohol	U140 SDR	5.6 5.0	(3)	170 5.0 ⁽¹³⁾	(3)

Regulatory Standards for BDAT List Waste Constituents
Volatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/kg)
228.	Methanol	K086 U154 SDR	5.6 5.6 0.25	(3) (3) NR TS 0.75 ⁽¹³⁾ (3)
34.	Methyl ethyl ketone	K086 U159 SDR	0.28 0.28 0.05	(3) (3) 36 36 0.75 ⁽¹³⁾ (3)
229.	Methyl isobutyl ketone	K086 U161 SDR	0.14 0.14 0.05	(3) (3) 33 33 0.33 ⁽¹³⁾ (3)
35.	Methyl methacrylate	U162	0.14	(3) 160 (3)
37.	Methacrylonitrile	U152	0.24	(3) 84 (3)
38.	Methylene Chloride	F001 F002 F003 F004 F005 F025 ⁽¹³⁾ F025 ⁽¹³⁾ K086 U080 SDR	0.44 0.44 0.44 0.44 0.44 0.089 0.089 0.089 0.089 0.20	(1) (1) (1) (1) (1) NR NR NR NR NR 31 31 33 33 0.96 ⁽¹³⁾ (3)
	2-Nitropropane	F005	TS	(3) TS (3)
39.	Pyridine	K026 U196 SDR	TS 0.014 1.12	(3) TS 16 0.33 ⁽¹³⁾ (3)
40.	1,1,1,2-Tetrachloroethane	K028 K095 K096 U208	0.007 0.057 0.057 0.057	(2) (3) (3) (3) 5.6 5.6 5.6 42 (2)

Regulatory Standards for BDAT List Waste Constituents
Volatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)		Non-wastewater standard (mg/kg)
			(1)	(2)	
41.	1,1,2,2-Tetrachloroethane	K020 K028 K095 K096 U209	0.007 0.007 0.057 0.057 0.057	(1) (2) (3) (3) (3)	5.6 5.6 5.6 5.6 42
42.	Tetrachloroethene	K016 K019 K020 K028 K030 K043 K073 K095 K096 U210 SDR	0.007 0.007 0.007 0.007 0.007 0.006 0.056 0.056 0.056 0.056 0.079	(1) (1) (1) (2) (1) (2) (3) (3) (3) (3) 0.05 ⁽¹⁾	6.0 6.0 6.0 6.0 6.0 1.7 6.2 6.0 6.0 5.6 0.05 ⁽¹⁾
43.	Toluene	K001 K015 K022 K037 K048 K049 K051 K052 K086 K087 U051 U220 SDR	0.028 .15 0.080 0.080 0.011 0.011 0.011 0.011 0.080 0.008 0.028 0.080 1.12	(3) (1) (3) (3) (1) (1) (1) (1) (3) (1) (3) (3)	28 6.0 0.034 28 14 14 14 28 0.65 28 28 0.33 ⁽¹⁾
44.	Tribromomethane (Bromoform)	U225	0.63	(3)	15 (3)
45.	1,1,1-Trichloroethane	K018 K019 K028	0.007 0.007 0.007	(1) (1) (2)	6.0 6.0 6.0

Regulatory Standards for BDAT List Waste Constituents
Volatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/kg)
45.	1,1,1-Trichloroethane (continued)	K029 K073 K086 U226 SDR	0.054 (3) 0.054 (3) 0.054 (3) 0.054 (3) 1.05	6.0 (2) 6.2 (3) 5.6 (3) 5.6 (3) 0.41 ⁽¹³⁾
46.	1,1,2-Trichloroethane	F001 F002 F003 F004 F005 F025 ^(*) F025 ^(*) K028 K095 K096 U227	0.030 (3) 0.030 (3) 0.030 (3) 0.030 (3) 0.030 (3) 0.054 (3) 0.054 (3) 0.007 (2) 0.054 (3) 0.054 (3) 0.054 (3)	7.6 (3) 7.6 (3) 7.6 (3) 7.6 (3) 7.6 (3) 6.2 (3) 6.2 (3) 6.0 (2) 6.0 (2) 6.0 (2) 5.6 (3)
47.	Trichloroethylene	F025 ^(*) F025 ^(*) K086 K095 K096 U228 SDR	0.054 (3) 0.054 (3) 0.054 (3) 0.054 (3) 0.054 (3) 0.054 (3) 0.062	5.6 (3) 5.6 (3) 5.6 (3) 5.6 (2) 5.6 (2) 5.6 (3) 0.091 ⁽¹³⁾
48.	Trichloromonofluoromethane	U121 SDR	0.020 (3) 0.05	33 0.96 ⁽¹³⁾ (3)
49.	1,2,3-Trichloropropene	K017	0.85 (3)	28 (3)
231.	1,1,2-Trichloro-1,2,2-trifluoroethane	SDR	1.05	0.96 ⁽¹³⁾
50.	Vinyl chloride	F025 ^(*) F025 ^(*) K029 U043	0.27 (3) 0.27 (3) 0.27 (3) 0.27 (3)	33 (3) 33 (3) 6.0 (2) 33 (3)

F-9

144

Regulatory Standards for BDAT List Waste Constituents
Volatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/kg)
215.	1,2-Xylene	K001	0.032	(3)
	1,3-Xylene	K048	0.011	(1)
	1,4-Xylene (total)	K049	0.011	(1)
		K051	0.011	(1)
		K052	0.011	(1)
		K086	0.32	(3)
		K087	0.014	(1)
		U051	0.032	(3)
		U239	0.032	(3)
		SDR	0.05	0.15 ⁽¹⁾

F-10

14

Regulatory Standards for BDAT List Waste Constituents
Semivolatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/kg)
51.	Acenaphthalene	K087	0.028 (1)	3.4 (1)
52.	Acenaphthene	K035 K051	NR 0.050 (1)	3.4 (3) 3.4
53.	Acetophenone	K022 K086 U004	0.010 (3) 0.010 (3) 0.010 (3)	19 (1) 9.7 (3) 9.7 (3)
233.	Acrylamide	K011 K013 K014	19 (3) 19 (3) 19 (3)	23 (2) 23 (2) 23 (2)
54.	2-Acetylaminofluorene	U005	0.059 (3)	140 (3)
55.	4-Aminobiphenyl	NR		
56.	Aniline	K083 K013 K104 U012	0.81 (3) 4.5 (1) 4.5 (1) 0.81 (3)	14 (3) 5.6 (1) 5.6 (1) 14 (3)
57.	Anthracene	K015 K035 K049 K051	1.0 (1) NR 0.039 (1) 0.039 (1)	3.4 (3) 3.4 (3) 28 (3) 28 (3)
58.	Aramite	NR		
59.	Benz(a)anthracene	K035 K051 U018	0.059 (3) 0.043 (1) 0.059 (3)	3.4 (3) 20 (1) 8.2 (3)

F-11

43

Regulatory Standards for BDAT List Waste Constituents
Semivolatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)		Non-wastewater standard (mg/kg)
60.	Benzenethiol	NR			
62.	Benzo(a)pyrene	K035	NR		3.4 (3)
		K048	0.047 (1)		12 (3)
		K049	0.047 (1)		12 (3)
		K050	0.047 (1)		12 (3)
		K051	0.047 (1)		12 (3)
		K052	0.047 (1)		12 (3)
		K060	0.035 (3)		3.6 (3)
		U022	0.061 (3)		8.2 (3)
63.	Benzo(b)fluoranthene	K015	.29	(1)	3.4 (3)
64.	Benzo-(ghi)perylene	NR			
65.	Benzo(k)fluoroanthene	K015	.29	(1)	3.4 (3)
66.	p-Benzoquinone	U197	TS	(3)	TS (3)
67.	Bis(2-chloroethoxy)-methane	U024	0.036	(3)	7.2 (3)
68.	Bis(2-chloroethyl)-ether	K017	0.033	(3)	7.2 (3)
		K019	0.007	(1)	5.6 (1)
		U025	0.033	(3)	7.2 (3)
69.	Bis(2-chloroisopropyl) ether	U027	0.055	(3)	7.2 (3)
70.	Bis(2-ethylhexyl)-phthalate	F024	0.036	(2)	1.8 (2)
		K048	0.043	(1)	7.3 (3)
		K049	0.043	(1)	7.3 (3)
		K051	0.043	(1)	7.3 (3)
		K086	0.28	(1)	28 (1)
		U028	0.54	(2)	28 (2)

F-12

1444

Regulatory Standards for BDAT List Waste Constituents
Semivolatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/kg)
71.	4-Bromophenyl phenyl ether	U030	0.055 (3)	15 (3)
72.	Butylbenzyl phthalate	K086	0.017 (3)	7.9 (3)
73.	2-sec-Butyl-4,6-dinitrophenol	P020	0.066 (3)	2.5 (3)
74.	p-Chloroaniline	P024	0.46 (3)	16 (3)
75.	Chlorobenzilate	U038	0.10 (3)	TS (3)
76.	p-Chloro m-cresol	U039	0.018 (3)	14 (3)
77.	2-Chloronaphthalene	U047	0.055 (3)	5.6 (3)
78.	2-Chlorophenol	K105 U048	0.044 (3) 0.044 (3)	4.4 (3) 5.7 (3)
80.	Chrysene	K035	0.059 (3)	3.4 (3)
		K048	0.043 (1)	15 (3)
		K049	0.043 (1)	15 (3)
		K051	0.043 (1)	15 (3)
		K087	0.028 (1)	3.4 (1)
		U050	0.059 (3)	8.2 (3)
81.	Ortho-Cresol	K035 K052 U052 SDR	0.11 (3) 0.011 (1) 0.11 (3) 2.82	NR 6.2 (3) 5.6 (3) 0.75 ⁽¹³⁾
82.	Para-Cresol	K035 K052 U052 SDR	0.77 (3) 0.011 (1) 0.77 (3) 2.82	NR 6.2 (3) 3.2 (3) 0.75 ⁽¹³⁾

F-13

145

Regulatory Standards for BDAT List Waste Constituents
Semivolatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/kg)
232.	Cyclohexanone	K083 K086 U057 SDR	0.36 (3) 0.36 (3) 0.36 (3) 0.125	NR (3) NR (3) TS (3) 0.75 ⁽¹³⁾
83.	Dibenz(a,h)-anthracene	K035 U063	NR 0.055 (3)	3.4 (3) 8.2 (3)
84.	Dibenzo(a,e)-pyrene	NR		
86.	m-Dichlorobenzene	K085 K096 U071	0.036 (3) 0.036 (3) 0.036 (3)	4.4 (3) 5.6 (2) 6.2 (3)
87.	o-Dichlorobenzene	K030 K042 K085 K086 K105 U070	0.008 (1) 0.088 (3) 0.088 (3) 0.088 (3) 0.088 (3) 0.088 (3)	NR 4.4 (3) 4.4 (3) 6.2 (3) 4.4 (3) 6.2 (3)
88.	p-Dichlorobenzene	K019 K030 K042 K085 K105 U072 SDR	0.008 (1) 0.008 (1) 0.090 (3) 0.090 (3) 0.090 (3) 0.090 (3) 0.65	NR NR 4.4 (3) 4.4 (3) 4.4 (3) 6.2 (3) 0.125 ⁽¹³⁾
89.	3,3'-Dichlorobenzidine	U073	TS (3)	TS (3)
234.	Cis-1,4-Dichloro-2-butene	U074	TS (3)	TS (3)
90.	2,4-Dichlorophenol	K043 U081	0.049 (2) 0.044 (3)	0.38 (2) 14 (3)
91.	2,6-Dichlorophenol	K043 U082	0.013 (2) 0.044 (3)	0.34 (2) 14 (3)

146

Regulatory Standards for BDAT List Waste Constituents
Semivolatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)		Non-wastewater standard (mg/kg)	
92.	Diethyl phthalate	K086 U088	0.20 0.54	(3) (2)	28	(3) (2)
93.	3,3'-Dimethoxybenzidine	U091	TS	(3)	TS	(3)
94.	p-Dimethylaminoazobenzene	U093	0.13	(3)	TS	(3)
95.	3,3'-Dimethylbenzidine	U095	TS	(3)	TS	(3)
96.	2,4-Dimethyl phenol	K049 K052 U101	0.033 0.033 0.036	(1) (1) (3)	NR NR 14	(3)
97.	Dimethyl phthalate	K086 U102	0.047 0.54	(3) (2)	28	(3) (2)
E-15	Di-n-butyl phthalate	K048 K051 K086 U069	0.060 0.060 0.057 0.54	(1) (1) (3) (2)	3.6 3.6 28 28	(3) (3) (3) (2)
	1,4-Dinitrobenzene	NR				
100.	4,6-Dinitro-o-cresol	P047	0.28 ⁽¹⁾	(3)	160 ⁽²⁾	(3)
101.	2,4-Dinitrophenol	K103 K104 P048	0.61 0.61 0.12	(1) (1) (3)	5.6 5.6 160	(1) (1) (3)
102.	2,4-Dinitrotoluene	K025 U105	TS 0.32	(3) (3)	TS 140	(3) (3)
103.	2,6-Dinitrotoluene	U106	0.55	(3)	28	(3)
104.	Di-n-octyl phthalate	K086 U107	0.017 0.54	(3) (2)	28	(3) (2)

271

Regulatory Standards for BDAT List Waste Constituents
Semivolatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/kg)
105.	Di-n-propylnitrosamine	U111	0.40 (3)	14 (3)
106.	Diphenylamine	K022 K083	0.52 ⁽³⁾ (3) 0.52 ⁽³⁾ (3)	NR NR
219.	Diphenylnitrosamine	K022 K083	0.40 ⁽³⁾ (3) 0.40 ⁽³⁾ (3)	NR NR
107.	1,2-Diphenylhydrazine	U109	TS (3)	TS (3)
108.	Fluoranthene	K035 K087 U120	0.068 (3) 0.028 (1) 0.068 (3)	3.4 (3) 3.4 (1) 8.2 (3)
109.	Fluorene	K019 K035 K048 K051	0.007 (1) NR 0.050 (1) 0.050 (1)	NR 3.4 (3) NR NR
110.	Hexachlorobenzene	F025 ⁽³⁾ K016 K018 K085 U127	0.055 (3) 0.033 (1) 0.033 (1) 0.055 (3) 0.055 (3)	37 (3) 28 (1) 28 (1) 4.4 (3) 37 (3)
111.	Hexachlorobutadiene	F025 ⁽³⁾ K016 K018 K028 K030 U128	0.055 (3) 0.007 (1) 0.007 (1) 0.007 (2) 0.007 (1) 0.055 (3)	28 (3) 5.6 (1) 5.6 (1) 5.6 (2) 5.6 (1) 28 (3)
112.	Hexachlorocyclopentadiene	K016 K032 K033 K034 K097 U130	0.007 (1) 0.057 (3) 0.057 (3) 0.057 (3) 0.057 (3) 0.057 (3)	5.6 (1) 2.4 (3) 2.4 (3) 2.4 (3) 2.4 (3) 3.6 (3)

F-16

148

Regulatory Standards for BDAT List Waste Constituents
Semivolatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)		Non-wastewater standard (mg/kg)	
113.	Hexachloroethane	F024	0.036	(2)	1.8	(2)
		F025 ^(*)	0.055	(3)	30	(3)
		K016	0.033	(1)	28	(1)
		K018	NR		28	(1)
		K019	0.033	(1)	28	(1)
		K028	0.033	(2)	28	(2)
		K030	0.033	(1)	28	(1)
		K073	0.055	(3)	30	(3)
		K095	0.055	(3)	28	(2)
		U131	0.055	(3)	28	(3)
114.	Hexachlorophene	U132	TS	(3)	TS	(3)
115.	Hexachloropropene	K030	NR		19	(1)
		U243	0.035	(3)	28	(3)
116.	Indeno-(1,2,3-cd)pyrene	K035	NR		3.4	(3)
		K087	0.028	(1)	3.4	(1)
		U137	0.0055	(3)	8.2	(3)
117.	Isosafrole	U141	0.081	(3)	2.6	(3)
118.	Methapyrilene	U155	0.081	(3)	1.5	(3)
119.	3-Methylcholanthrene	U157	0.0055	(3)	15	(3)
120.	4,4'-Methylenebis-(2-chloro-aniline)	U158	0.50	(3)	35	(3)
36.	Methyl methane-sulfonate		NR			
121.	Naphthalene	K001	0.031	(3)	1.5	(3)
		K019	0.007	(1)	5.6	(1)
		K035	0.059	(3)	3.4	(3)
		K048	0.033	(1)	42	(3)
		K049	0.033	(1)	42	(3)
		K051	0.033	(1)	42	(3)
		K052	0.033	(1)	42	(3)

149

Regulatory Standards for BDAT List Waste Constituents
Semivolatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)		Non-wastewater standard (mg/kg)	
121.	Naphthalene (continued)	K060 K086 K087 U051 U165	0.028 0.059 0.028 0.031 0.059	(3) (3) (1) (3) (3)	3.4 3.1 3.4 1.5 3.1	(3) (3) (3) (3) (3)
122.	1,4-Naphthoquinone	U166	TS	(3)	TS	(3)
123.	1-Naphthylamine	U167	TS	(3)	TS	(3)
124.	2-Naphthylamine	U168	0.52	(3)	TS	(3)
	O-Nitroaniline	K101	0.27	(1)	14	(1)
125.	p-Nitroaniline	P077	0.028	(3)	28	(3)
126.	Nitrobenzene	K025 K083 K086 K103 K104 U169 SDR	TS 0.068 0.068 0.073 0.073 0.068 0.66	(3) (3) (3) (1) (1) (3) 0.125 ⁽¹³⁾	TS 14 14 5.6 5.6 14 0.125 ⁽¹³⁾	(3) (3) (3) (1) (1) (3)
127.	4-Nitrophenol	K025 U170	TS 0.12	(3) (3)	TS 29	(3) (3)
	O-Nitrophenol	K102	0.028	(1)	13	(1)
128.	N-Nitrosodi-n-butylamine	U172	0.40	(3)	17	(3)
129.	N-Nitrosodiethylamine	U174	0.40	(3)	28	(3)
130.	N-Nitrosodimethylamine	P082	0.40	(3)	TS	(3)
131.	N-Nitrosomethylethylamine		NR			

Regulatory Standards for BDAT List Waste Constituents
Semivolatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)		Non-wastewater standard (mg/kg)	
132.	N-Nitrosomorpholine	NR				
133.	N-Nitrosopiperidine	U179	0.013	(3)	35	(3)
134.	N-Nitrosopyrrolidine	U180	0.013	(3)	35	(3)
135.	5-Nitro-o-toluidine	U181	0.32	(3)	28	(3)
136.	Pentachlorobenzene	K030 K042 K085 U183	NR 0.055 0.055 0.055	(3) (3) (3)	28 4.4 4.4 37	(1) (3) (3) (3)
137.	Pentachloroethane	K018 K028 K030 K095 K096 U184	0.007 0.033 0.007 0.055 0.055 TS	(1) (2) (1) (3) (3)	5.6 5.6 5.6 5.6 5.6 TS	(1) (2) (1) (2) (2) (3)
138.	Pentachloronitrobenzene	U185	0.055	(3)	4.8	(3)
139.	Pentachlorophenol	K001 K043 U051 SDR	0.18 0.22 0.18 0.01	(3) (2) (3) (3)	7.4 1.9 7.4 0.01 ⁽¹⁾	(3) (2) (3) (3)
140.	Phenacetin	U187	0.081	(3)	16	(3)
141.	Phenanthrene	K001 K015 K019 K035 K048 K049 K051 K052	0.031 0.27 0.007 0.059 0.039 0.039 0.039 0.039	(3) (1) (1) (3) (1) (1) (1) (1)	1.5 3.4 5.6 3.4 34 34 34 34	(3) (3) (1) (3) (3) (3) (3) (3)

F-19

151

Regulatory Standards for BDAT List Waste Constituents
Semivolatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/kg)	
141.	Phenanthrene (continued)	K087 U051	0.028 0.031	(1) (3)	3.4 1.5
142.	Phenol	K022 K035 K048 K049 K050 K051 K052 K060 K083 K103 K104 K105 U188	0.039 0.039 0.047 0.047 0.047 0.047 0.047 0.042 0.039 1.4 1.4 0.039 0.039	(3) (3) (1) (1) (1) (1) (1) (3) (3) (1) (1) (3) (3)	12 NR 3.6 3.6 3.6 3.6 3.6 3.4 5.6 5.6 5.6 4.4 6.2
220.	Phthalic anhydride	K023 K024 K093 K094 U190	0.54 0.54 0.54 0.54 0.54	(2) (2) (2) (2) (2)	28 28 28 28 28
144.	Pronamide	U192	0.093	(3)	1.5
145.	Pyrene	K001 K035 K048 K049 K051 U051	0.028 0.067 0.045 0.045 0.045 0.028	(3) (3) (1) (1) (1) (3)	1.5 8.2 36 36 36 1.5
146.	Resorcinol	U201	TS	(3)	TS
147.	Safrole	U203	0.081	(3)	22

Regulatory Standards for BDAT List Waste Constituents
Semivolatile Organics (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/kg)
148.	1,2,4,5-Tetrachlorobenzene	K019 K030 K042 K085 U207	0.017 (1) 0.017 (1) 0.055 (3) 0.055 (3) 0.055 (3)	NR 14 (1) 4.4 (3) 4.4 (3) 19 (3)
149.	Total-Tetrachlorophenol	K043 SDR	0.018 (2) 0.01	0.68 (2) 0.01 ⁽¹³⁾
150.	1,2,4-Trichlorobenzene	K019 K030 K042 K085 K096	0.023 (1) 0.023 (1) 0.055 (3) 0.055 (3) 0.055 (3)	19 (1) 19 (1) 4.4 (3) 4.4 (3) 19 (2)
151.	2,4,5-Trichlorophenol	D017 K043 K105 SDR	TS (3) 0.016 (2) 0.18 (3) 0.05	7.9 (3) 8.2 (2) 4.4 (3) 0.05 ⁽¹³⁾
152.	2,4,6-Trichlorophenol	K043 K105 SDR	0.039 (2) 0.035 (3) 0.05	7.6 (2) 4.4 (3) 0.15 ⁽¹³⁾
153.	Tris(2,3-dibromo-propyl)-phosphate	U235	0.025 (2)	0.1 (2)

Regulatory Standards for BDAT List Waste Constituents

Metals

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/l) (TCLP values, otherwise noted)
154.	Antimony	K021	0.60 (3)	0.23 (3)
155.	Arsenic	D004 D004 ⁽¹⁵⁾ K031 K048 K049 K050 K051 K052 K084 K101 K102 P010 P011 P012 P036 P038 U136	5.0 (3) NA 0.79 (3) NR NR NR NR 0.79 (3) 0.79 (3) 0.79 (3) 0.79 (3) 0.79 (3) 0.79 (3) 0.79 (3) 0.79 (3)	5.0 ⁽²⁾ (3) TS 5.6 ⁽²⁾ (3) 0.004 (1) 0.004 (1) 0.004 (1) 0.004 (1) 0.004 (1) 5.6 ⁽²⁾ (3) 5.6 ⁽²⁾ (3)
156.	Barium	D005 D005 ⁽¹⁵⁾ P013	100 (3) NA NR	100 TS 52 ⁽²⁾ (3)
157.	Beryllium	P015	TS (3)	TS (3)
158.	Cadmium	D006 D006 ⁽¹⁵⁾ F006 F007 F008 F009 F011 F012	1.0 (3) NA 1.6 (3) NR NR NR NR	1.0 TS 0.066 (2) 0.066 (2) 0.066 (2) 0.066 (2) 0.066 (2) 0.066 (2)

F-22

154

Regulatory Standards for BDAT List Waste Constituents

Metals (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)		Non-wastewater standard (mg/l) (TCLP values, otherwise noted)	
158.	Cadmium (continued)	K028 K061 ⁽¹²⁾ K061 ⁽¹³⁾ K069 K100 K101 K102	6.4 1.61 1.61 1.6 1.6 0.24 0.24	(2) (3) (3) (3) (3) (3)	NR 0.14 0.14 0.14 0.066 0.066 0.066	(2) (1) (1) (3) (3) (1) (1)
159.	Chromium (total)	D007 D007 ⁽¹⁵⁾ F006 F007 F008 F009 F011 F012 F019 F024 K002 K003 K004 K005 K006 (anhydrous) K006 (hydrated) K007 K008 K015 K022 K028 K048 K049 K050 K051 K052 K061 ⁽¹²⁾	5.0 NA 0.32 0.32 0.32 0.32 0.32 0.32 0.35 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.9 0.32 0.35 0.35 0.20 0.20 0.20 0.20 0.32	(3) (3) (3) (2) (2) (2) (2) (2) (2) (2) (3) (3) (3) (3) (3) (3) (3) (3) (3) (1) (3) (2) (1) (1) (1) (1) (1) (1)	5.0 TS 5.2 5.2 5.2 5.2 5.2 5.2 5.2 0.094 0.094 0.094 0.094 0.094 0.094 0.094 0.094 1.7 5.2 0.073 1.7 1.7 1.7 1.7 1.7 5.2	(3) (3) (1) (2) (2) (2) (2) (2) (2) (3) (3) (3) (3) (3) (3) (3) (3) (3) (3) (3) (3) (3) (3) (3) (3) (3) (3)

Regulatory Standards for BDAT List Waste Constituents

Metals (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/l) (TCLP values, otherwise noted)
159.	Chromium (total) (continued)	K061 ⁽¹³⁾ K062 K086 K100 K101 K102 U032	0.32 (3) 0.32 (1) 0.32 (1) 0.32 (3) NR NR 0.32 (3)	5.2 (1) 0.094 (1) 0.094 (3) 5.2 (3) 5.2 (1) 5.2 (1) 0.094 (3)
221.	Chromium (hexavalent)	NR		
160.	Copper	NR		
161.	Lead Lead acid batteries	D008 D008 D008 ⁽¹³⁾ F006 F007 F008 F009 F011 F012 F024 K001 K002 K003 K004 K005 K006 (anhydrous) K006 (hydrated) K007 K008 K028 K044 K045	5.0 (3) TS (3) NA 0.040 (3) 0.040 (2) 0.040 (2) 0.040 (2) 0.040 (2) 0.040 (2) 0.040 (2) NR (2) 0.037 (1) 3.4 (3) 3.4 (3) 3.4 (3) 3.4 (3) 3.4 (3) 3.4 (3) 3.4 (3) 3.4 (3) 0.037 (2) TS (3) TS (3)	5.0 ⁽²⁾ (3) TS (3) TS (3) 0.51 (1) 0.51 (2) 0.51 (2) 0.51 (2) 0.51 (2) 0.51 (2) 0.51 (2) 0.51 (2) 0.51 (2) 0.51 (3) 0.37 (3) 0.37 (3) 0.37 (3) 0.37 (3) 0.37 (3) 0.37 (3) 0.37 (3) 0.37 (3) 0.37 (3) 0.021 (3) TS (3) TS (3)

Regulatory Standards for BDAT List Waste Constituents

Metals (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/l) (TCLP values, otherwise noted)
161.	Lead (continued)	K046 K047 K048 K049 K050 K051 K052 K061 K062 K069 K086 K087 K100 K101 K102 P110 U051 U144 U145 U146	0.037 (3) TS (3) 0.037 (1) 0.037 (1) 0.037 (1) 0.037 (1) 0.037 (1) 0.51 (3) 0.04 (1) 0.51 (3) 0.037 (3) 0.037 (1) 0.51 (3) 0.17 (3) 0.17 (3) 0.040 (3) 0.037 (3) 0.040 (3) 0.040 (3) 0.040 (3)	0.18 (3) TS (3) NR NR NR NR NR 0.24 (1) 0.37 (1) 0.24 (3) 0.37 (3) 0.51 (1) 0.51 (3) 0.51 (1) 0.51 (3) 0.51 (3) 0.51 (3) 0.51 (3)
162.	Mercury	D009 ⁽⁵⁾ D009 ⁽⁵⁾ D009 ⁽⁶⁾ D009 ⁽¹⁵⁾ K071 K101 K102 K106 ⁽⁵⁾ K106 ⁽⁶⁾ K106 ⁽⁶⁾ P065 ⁽⁵⁾ P065 ⁽⁶⁾	0.20 (3) 0.20 (3) 0.20 (3) NA 0.030 (1) 0.082 (3) 0.082 (3) 0.030 (3) 0.030 (3) 0.030 (3) 0.030 (3) 0.030 (3)	TS ⁽⁵⁾ (3) TS ⁽⁶⁾ (3) 0.20 ⁽¹⁵⁾ (3) TS (3) 0.025 (3) NR NR TS (3) 0.20 ⁽⁶⁾ (3) 0.025 ⁽⁶⁾ (3) TS (3) 0.20 ⁽⁶⁾ (3)

F-25

157

Regulatory Standards for BDAT List Waste Constituents

Metals (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)		Non-wastewater standard (mg/l) (TCLP values, otherwise noted)	
162.	Mercury (continued)	P065 ^(*)	0.030	(3)	0.025 ^(*)	(3)
		P065	0.030	(3)	TS	(3)
		P092	0.030	(3)	TS	(3)
		U151 ^(*)	0.030	(3)	TS	(3)
		U151 ^(*)	0.030	(3)	0.20 ^(*)	(3)
		U151 ^(*)	0.030	(3)	0.025 ^(*)	(3)
		U151 ^(**)	NA		TS	(3)
163.	Nickel	F006	0.44	(3)	0.32	(1)
		F007	0.44	(2)	0.32	(2)
		F008	0.44	(2)	0.32	(2)
		F009	0.44	(2)	0.32	(2)
		F011	0.44	(2)	0.32	(2)
		F012	0.44	(2)	0.32	(2)
		F024	0.47	(2)	0.088	(3)
		K015	0.44	(1)	0.20	(3)
		K022	0.47	(3)	0.032	(1)
		K028	0.47	(2)	0.088	(3)
		K048	NR		0.20	(1)
		K049	NR		0.20	(1)
		K050	NR		0.20	(1)
		K051	NR		0.20	(1)
		K052	NR		0.20	(1)
		K061 ^(**)	0.44	(3)	0.32	(1)
		K061 ^(**)	0.44	(3)	0.32	(1)
		K062	0.44	(1)	NR	
		K083	0.47	(3)	0.088	(3)
		K101	NR		0.32	(1)
		K102	NR		0.32	(1)
		K115	0.47	(2)	0.32	(2)
		P073	0.32	(3)	0.32	(3)
		P074	0.44	(2)	0.32	(2)

Regulatory Standards for BDAT List Waste Constituents

Metals (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/l) (TCLP values, otherwise noted)
164.	Selenium	D010 D010 ⁽¹⁵⁾ K048 K049 K050 K051 K052 P103 P114 U204 U205	1.0 NA NR NR NR NR 1.0 1.0 1.0 1.0 (3) (3) (3) (3) (3)	5.7 TS 0.025 0.025 0.025 0.025 0.025 5.7 5.7 5.7 5.7 (3) (3) (3) (3) (3)
165.	Silver	D011 D011 ⁽¹⁵⁾ F006 F011 F012 P099 P104	5.0 NA NR NR NR 0.29 0.29 (3) (3)	5.0 TS 0.072 0.072 0.072 0.072 0.072 0.072 (3) (3) (1) (2) (2) (2) (2)
166.	Thallium	P113 P114 P115 U214 U215 U216 U217	0.14 NR 0.14 0.14 0.14 0.14 0.14 (3) (3) (3) (3) (3) (3) (3)	TS NR TS TS TS TS TS (3)
167.	Vendadium	P119 P120	28 28 (3) (3)	TS TS (3) (3)
168.	Zinc	P122 U249	TS TS (3) (3)	TS TS (3) (3)

Regulatory Standards for BDAT List Waste Constituents
Inorganics Other Than Metals

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/kg)
169.	Cyanides (total)	D003 F006 F007 F008 F009 F010 F011 F012 F019 K005 K007 K011 K013 K014 K048 K049 K050 K051 K052 K060 K086 K104 P013 P021 P029 P030 P063 P074 P098 P099 P104 P106 P121	Reserved (3) 1.2 (3) 1.9 (2) 1.9 (2) 1.9 (2) 1.9 (2) 1.9 (2) 1.9 (2) 1.9 (2) 0.74 (3) 0.74 (3) 21 (3) 21 (3) 21 (3) 0.028 (3) 0.028 (3) 0.028 (3) 0.028 (3) 0.028 (3) 1.9 (3) 1.9 (3) 2.7 (1) 1.9 (2) 1.9 (2)	590 (3) 590 (2) 590 (2) 590 (2) 590 (2) 1.5 (2) 110 (2) 110 (2) 590 (3) Reserved (3) Reserved (3) 57 (2) 57 (2) 57 (2) 1.8 (1) 1.8 (1) 1.8 (1) 1.8 (1) 1.8 (1) 1.2 (3) 1.5 (3) 1.8 (3) 110 (2) 110 (2)
169.	Cyanide (amenable)	D003 F006 F007 F008	0.86 (3) 0.86 (3) 0.10 (2) 0.10 (2)	30 (3) 30 (2) 30 (2) 30 (2)

Regulatory Standards for BDAT List Waste Constituents
Inorganics Other Than Metals (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)		Non-wastewater standard (mg/kg)	
169.	Cyanide (amenable) (continued)	F009 F010 F011 F012 F019 K011 K013 K014 P013 P021 P029 P030 P063 P074 P098 P099 P104 P106 P121	0.10 0.10 0.10 0.10 0.86 Reserved Reserved Reserved 0.1 0.1 0.1 0.1 0.1 0.2 0.1 0.1 0.1 0.1 0.1 0.1	(2) (2) (2) (2) (3) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2)	30 NR 9.1 9.1 30 Reserved Reserved Reserved 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1	(2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2)
170.	Fluoride	P056 U134	35 35	(3) (3)	TS TS	(3) (3)
171.	Sulfide	NR				
172.	Aldrin	P004	0.021	(3)	0.066	(3)
173.	alpha-BHC	U129	0.00014	(3)	0.066	(3)
174.	beta-BHC	U129	0.00014	(3)	0.066	(3)
175.	delta-BHC	U129	0.023	(3)	0.066	(3)
176.	gamma-BHC (Lindane)	D013 U129	TS 0.0017	(3) (3)	0.066 0.066	(3) (3)

Regulatory Standards for BDAT List Waste Constituents
Organochlorine Pesticides (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/kg)
177.	Chlordane	K032 K097 U036	0.0033 (3) 0.0033 (3) 0.0033 (3)	0.26 (3) 0.26 (3) 0.13 (3)
178.	p,p'DDD	U060 U061	0.023 (3) 0.023 (3)	0.087 (3) 0.087 (3)
235.	o,p'DDD	U060 U061	0.023 (3) 0.023 (3)	0.087 (3) 0.087 (3)
179.	p,p'DDE	U061	0.031 (3)	0.087 (3)
F-30	236.	o,p'DDE	U061	0.031 (3)
180.	p,p'DDT	U061	0.0039 (3)	0.087 (3)
237.	o,p'DDT	U061	0.0039 (3)	0.087 (3)
181.	Dieldrin	P037	0.017 (3)	0.13 (3)
182.	Endosulfan I	P050	0.023 (3)	0.066 (3)
183.	Endosulfan II	P050	0.029 (3)	0.13 (3)
238.	Endosulfan sulfate	P050	0.029 (3)	0.13 (3)
184.	Endrin	D012 P051	TS (3) 0.0028 (3)	0.13 (3) 0.13 (3)
185.	Endrin aldehyde	P051	0.025 (3)	0.13 (3)
186.	Heptachlor	K032 K097 P059	0.0012 (3) 0.0012 (3) 0.0012 (3)	0.066 (3) 0.066 (3) 0.066 (3)
187.	Heptachlor epoxide	K032 K097 P059	0.016 (3) 0.016 (3) 0.016 (3)	0.066 (3) 0.066 (3) 0.066 (3)

Regulatory Standards for BDAT List Waste Constituents
Organochlorine Pesticides (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/kg)
188.	Isodrin	P060	0.021 (3)	0.066 (3)
189.	Kepone	U142	0.0011 (3)	0.13 (3)
190.	Methoxychlor	D014 U247	TS (3) 0.25 (3)	0.18 (3) 0.18 (3)
191.	Toxaphene	D015 K041 K098 P123	TS (3) 0.0095 (3) 0.0095 (3) 0.0095 (3)	1.3 (3) 2.6 (3) 2.6 (3) 1.3 (3)
<u>Phenoxyacetic Acid Herbicides</u>				
F-31	2,4-Dichlorophenoxyacetic acid	D016 K099 U240	TS (3) 1.0 (1) 0.72 (3)	10 (3) 1.0 (1) 10 (3)
193.	Silvex	NR		
194.	2,4,5-T	D017	TS (3)	7.9 (3)
<u>Organophosphorous Insecticides</u>				
195.	Disulfoton	K036 K037 P039	0.025 (2) 0.025 (3) 0.017 (2)	0.1 (3) 0.1 (1) 0.1 (2)
196.	Famphur	P097	0.025 (2)	0.1 (2)
197.	Methyl parathion	P071	0.025 (2)	0.1 (2)
198.	Parathion	P089	0.025 (2)	0.1 (2)
199.	Phorate	K038 K040 P094	0.025 (2) 0.025 (2) 0.025 (2)	0.1 (2) 0.1 (2) 0.1 (2)

163

Regulatory Standards for BDAT List Waste Constituents
PCBs

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)	Non-wastewater standard (mg/kg)
200.	Aroclor 1016	K085	0.013 (3)	0.92 (3)
201.	Aroclor 1221	K085	0.014 (3)	0.92 (3)
202.	Aroclor 1232	K085	0.013 (3)	0.92 (3)
203.	Aroclor 1242	K085	0.017 (3)	0.92 (3)
204.	Aroclor 1248	K085	0.013 (3)	0.92 (3)
205.	Aroclor 1254	K085	0.014 (3)	1.8 (3)
206.	Aroclor 1260	K085	0.014 (3)	1.8 (3)
<u>Dioxins and Furans</u>				
207.	Hexachlorodibenzo-p-dioxin	F024 K043 K099 SDR	0.001 (2) 0.001 (2) 0.001 (1) 0.001	0.001 (2) 0.001 (2) 0.001 (1) 0.001 ^(**)
208.	Hexachlorodibenzo-furans	F024 K043 K099 SDR	0.001 (2) 0.001 (2) 0.001 (1) 0.001	0.001 (2) 0.001 (2) 0.001 (1) 0.001 ^(**)
209.	Pentachlorodibenzo-p-dioxin	F024 K043 K099 SDR	0.001 (2) 0.001 (2) 0.001 (1) 0.001	0.001 (2) 0.001 (2) 0.001 (1) 0.001 ^(**)
210.	Pentachlorodibenzo-furans	F024 K043 K099 SDR	0.001 (2) 0.001 (2) 0.001 (1) 0.001	0.001 (2) 0.001 (2) 0.001 (1) 0.001 ^(**)

F-32

164

Regulatory Standards for BDAT List Waste Constituents
Dioxins and Furans (continued)

BDAT list number	Constituent name	Codes in which constituent is regulated	Wastewater standard (mg/l)		Non-wastewater standard (mg/kg)	
211.	Tetrachlorodibenzo-p-dioxin	K043 K099 SDR	0.011 0.001 0.001	(2) (1)	0.001 0.001 0.001 ⁽¹⁴⁾	(2) (1)
211.	Tetrachlorodibenzo-furans	F024 K043 K099 SDR	0.001 0.001 0.001 0.001	(2) (2) (1)	0.001 0.001 0.001 0.001 ⁽¹⁴⁾	(2) (2) (1)
213.	2,3,7,8-Tetrachlorodibenzo-p-dioxin	SDR	0.001		0.001 ⁽¹⁴⁾	